

Notice of Allowability

Application No.

10/736,437

Examiner

Joni Hsu

Applicant(s)

KIRK ET AL.

Art Unit

2628

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to papers received June 30, 2006.
2. ☒ The allowed claim(s) is/are 11-16, 30-32 and 35.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some* c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
- (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
- 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
- (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|---|--|
| 1. <input type="checkbox"/> Notice of References Cited (PTO-892) | 5. <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 6. <input type="checkbox"/> Interview Summary (PTO-413),
Paper No./Mail Date _____. |
| 3. <input type="checkbox"/> Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date _____ | 7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit
of Biological Material | 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| | 9. <input type="checkbox"/> Other _____. |

DETAILED ACTION

Response to Amendment

1. Applicant's arguments, see page 5, filed June 30, 2006, with respect to Claims 11-16, 30-32, and 35 have been fully considered and are persuasive. The 35 U.S.C. 101 rejection of Claim 11 and the 35 U.S.C. 103(a) rejections of 11-16 and 35 has been withdrawn.

EXAMINER'S AMENDMENT

2. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

3. Authorization for this examiner's amendment was given in a telephone interview with James Sheridan on July 7, 2006.

4. The application has been amended as follows:

Claims 31 and 32 are amended to recite "**The** programmable graphics processor..." instead of "**A** programmable graphics processor...".

Claim 35 is amended to recite "**The** computer-readable medium..." instead of "**A** computer-readable medium...".

Allowable Subject Matter

5. Claims 11-16, 30-32, and 35 are allowed.

The following is an examiner's statement of reasons for allowance:

6. The prior art taken singly or in combination do not teach or suggest outputting write position information to the conflict detection unit confirming that shading of the first fragment and writing to the buffer is complete, as recited in Claim 11. Claims 12-16 and 35 depend from Claim 11, and therefore also contain allowable subject matter.

The prior art also does not teach a fragment processing pipeline configured to handle read-after-write hazards during execution of shader programs including an instruction to write a location in graphics memory, an instruction to check the location in a conflict detection unit and a subsequent instruction to read a location in graphics memory without an intervening instruction to flush the fragment processing pipeline based on the check of the conflict detection unit, as recited in Claim 30. Claims 31 and 32 depend from Claim 30, and therefore also contain allowable subject matter.

7. The closest prior art (Duluk US006288730B1) teaches a programmable graphics processor for execution of program instructions (Col. 1, lines 64-67), comprising a read interface (1210, Figure 2) configured to read data from a graphics memory (1213; Col. 8, lines 59-60); a fragment processing unit configured to receive fragments (Col. 7, lines 40-41), each fragment associated with a position (Col. 8, lines 23-24), and the data from the graphics memory and generate processed fragments (Col. 7, lines 40-43); a conflict detection unit (2602, Figure 13b)

configured to selectively store the position associated with each fragment and generate a position conflict status (Col. 14, lines 18-24); a write interface (1210, Figure 2) configured to write the processed fragments to the graphics memory (Col. 8, lines 59-60); and a fragment processing pipeline (Col. 5, lines 14-17; Col. 8, lines 19-27) configured to handle conflicts during execution of shader programs (Col. 6, lines 61-65) including an instruction to write a location in graphics memory, an instruction to check the location in a conflict detection unit and a subsequent instruction to read a location in graphics memory (Col. 14, lines 18-24). However, Duluk does not teach that the conflicts are read-after-write hazards, the read is done without an interleaving instruction to flush the fragment processing pipeline based on the check of the conflict detection unit, and outputting write position information to the conflict detection unit confirming that shading of the first fragment and writing to the buffer is complete.

8. Another prior art (Mendelson US005996060A) teaches a processing pipeline configured to handle read-after-write hazards including writing a location in memory (Col. 4, lines 23-24), and a subsequent instruction to read a location in memory (Col. 4, lines 27-35) without an interleaving instruction to flush the processing pipeline (Col. 6, lines 12-22). However, Mendelson does not teach that the processing pipeline processes fragments, the read-after-write hazards are handled during execution of shader programs, and outputting write position information to the conflict detection unit confirming that shading of the first fragment and writing to the buffer is complete.

9. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Prior Art of Record

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

1. Duluk (US006288730B1) teaches a three-dimensional computer graphics system (Col. 1, lines 42-46) that monitors incoming address requests and reorders those requests so as to avoid memory conflicts (Col. 14, lines 15-18).
2. Mendelson (US005996060A) teaches a forwarding technique used in the case of a read-after-write conflict that affords to skip conventional house cleaning stages by injecting the result to the waiting operand of the succeeding instruction, immediately upon the production thereof at the output of the execution unit (Col. 6, lines 12-22).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joni Hsu whose telephone number is 571-272-7785. The examiner can normally be reached on M-F 8am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ulka Chauhan can be reached on 571-272-7782. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JH


ULKA CHAUHAN
SUPERVISORY PATENT EXAMINER